LG Chem Yeosu Complex	Material Safety Data Sheet	Identity No.	GHS – 3AA - 004
	BUTYL ACRYLATE (CAS No. 141-32-2)	Pages	1/12

1. Identification of the product and the supplier

1) Product name : N-BUTYL ACRYLATE, INHIBITED

2) Advisable use and Restriction
○ Advisable use :
- synthetic textiles, leather, paint
– coating, adhesive, felt, emulsifier

○ Restriction of product using : Not available

3) Manufacturer/Supplier/Distributor information
○ Company : LG Chem, LTD. Acrylate plant
○ Address : 451, Sandanjungang-ro, Yeosu-si, Jeollanam-do
○ Emergency response number : 061-680-6910
○ Respondent : 3AA Team

2. Hazard identification

1) Hazard classification :

- Flammable liquid :	Category 3
- Acute toxicity (oral) :	Category 5
- Acute toxicity (dermal) :	Category 5
- Acute Toxicity(inhalation: vapour) :	Category 4
- Skin corrosion/irritation :	Category 2
- Eye Damage/Irritation :	Category 2A
- Skin sensitization :	Category 1
- Target Organ Systemic Toxicity(single exposure) :	Category 3 (respiratory irritation)
- Acute aquatic toxicity :	Category 2

2) Allocation label elements

○ Pictogram and symbol

○ Signal word : Warning

○ Hazard statement
H226 Flammable liquid and vapour
H303 May be harmful if swallowed
H313 May be harmful in contact with skin
H315 Causes skin irritation
H317 May cause an allergic skin reaciton

H319 Causes serious eye irritation
H332 Harmful if inhaled
H335 May cause respiratory irritation
H401 Toxic to aquatic life

○ Precautionary statements

- Prevention: P210: Keep away from flames and hot surfaces. - No smoking
  P233: Keep container tightly closed.
  P240: Ground/bond container and receiving equipment.
  P241: Use explosion-proof electrical/ventilating/lighting/ equipment.
  P242: Use only non-sparking tools.
  P243: Take precautionary measures against static discharge.
  P261: Avoid breathe dust/fume/gas/mist/vapours/spray.
  P264: Wash thoroughly after handling.
  P271: Use only outdoors or in a well-ventilated area.
  P272: Contaminated work clothing should not be allowed out of the workplace.
  P273: Avoid release to the environment.
  P280: Wear protective gloves/protective clothing/eye protection/face protection.
- Response: P312: Call a POISON CENTER or doctor/physician if you feel unwell.
  P302+P352: If on skin: Wash with plenty of soap and water.
  P362: Take off contaminated clothing and wash before reuse.
  P363: Wash contaminated clothing before reuse.
  P303+P361+P353: If on skin (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
  P321: Specific treatment as reference to supplemental first aid instruction.
  P304+P340: If inhaled: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
  P305+P351+P338: In IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and wash to do. Continue rinsing.
  P370+P378: In case of fire: Use for extinction
  P332+P313: If skin irritation occurs: Get medical advice/attention.
  P333+P313: If skin irritation or a rash occurs: Get medical advice/attention.
  P337+P313: If eye irritation persists: Get medical advice/attention.
- Storage : P403+P233: Store in a well ventilated place. Keep container tightly closed.
  P403+P235: Store in a well ventilated place. Keep cool.
  P405: Store locked up.
- Disposal : P501: Dispose of contents/container to in accordance with local/regional/ national/international regulations (to be specified).

3) Other hazard information not included in hazard classification
- NFPA Rating system : Health: **2,** Flammability: **2,** Reactivity: **-**

3. Composition/information on ingredients

Chemical Name	Common name Synonyms	CAS No.	Content (%)
n-BUTYLACRYLATE,INHIBITED	N-BUTYL ESTER BUTYL 2-PROPENOATE BUTYL 2-PROPENOIC ACID	141-32-2	>= 99.5
4-METHOXYPHENOL	-	150-76-5	0.0015±0.0005
HYDROQUINONE	-	123-31-9	0.00400~0.10000

4. First-aid measures

1) Eye contact :
-In case of contact with chemicals, immediately flush eyes with running water for more than 15 minutes.
-Remove contact lenses if present and easy to do.
-Get immediate medical advice/attention if irritating, pain, swelling, tear, dazzling eyes occur.

2) Skin contact
-Wash off immediately with plenty of water and soap for at least 15 minutes.
-Wash and dry carefully contaminated clothing and shoes before reuse.
-In case of contact with chemicals, get immediate medical advice/attention.

3) Inhalation
-Move victims immediately to place with fresh air and not contaminated area.
-Give artificial respiration if victim is not breathing.
-If not breathing, give artificial respiration and have a trained individual administer oxygen.
-Get medical attention immediately if inhaled.

4) Ingestion
-Drink two-four glasses of water or milk.
-If person is unconscious, do not induce vomiting or ingested.
-If person is conscious, do induce vomiting.
-If swallowed, immediately call a POISON CENTER or doctor/physician.

5) Acute and delayed symptoms/effects
-Inhalation:
short-term exposure: May cause respiratory, nasal mucosa, lung irritation.
long-term exposure: May cause irritation of the nasal mucosa, hemorrhagic discharge from eyes and noses and severe dyspnea.
-Skin contact :
short-term exposure: May cause erythema, dropsy, necrosis.
-Eye contact :
short-term exposure: May cause irritation of corneal.

6) Indication of immediate medical attention and notes for physician
-Get immediate medical advice/attention if exposure.
-Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.
-Call 911 or emergency medical service.
-Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.
-Keep victim warm and quiet.
-Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed.

5. Fire-fighting measures

1) Suitable (and unsuitable) extinguishing media
○ suitable extinguishing media:
-Small fire: Dry chemical, CO_2, water spray, alcohol-resistant foam
-Large fire: fog or alcohol-resistant foam, water spray
○ unsuitable extinguishing media: Do not use straight streams
○ In case of major fire and large quantities:
-Move containers from fire area if you can do it without risk.
-Use water spray or alcohol-resistant foam.
○ tank/trailer/train truck fire:
-Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
-For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.
-Cool containers with flooding quantities of water until well after fire is out.
-Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
-ALWAYS stay away from tanks engulfed in fire.

2) Specific hazards arising from the chemical
○ Thermal decomposition products : Carbon oxides (CO, CO_2)
○ Fires and an explosion
- HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.
- Vapours may explode when mixed with air.
- Will be explosively polymerized by heat or fires.
- Vapours explosion hazard indoors, outdoors or in sewers.
- Containers may explode when heated.
- Most vapours are heavier than air. They will spread along ground and collect in low or confined areas. (sewers, basements, tanks)
- Vapour or gas may travel from a distance in an instance after ignition.

3) Special protective equipment and precautions for fire-fighters
- Protective: safety helmet, AIR CYLINDER MASK(air respirator), fireproof-cloth(heatproof clothes), chemical-resistant gloves
- Stay up wind and keep out of low areas.
- Structural firefighters' protective clothing will only provide limited protection.
- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles: cool containers with flooding quantities of water until well after fire is out.
- Keep unauthorized personnel away : Let the fire burn.

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.
- Do not inhale the substance itself or the burning artifact.
- Water may be ineffective.
- Call emergency response telephone number on shipping paper first. If shipping paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.
- Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution.

6. Accidental release measures

1) Personal precautions, protective equipment and emergency procedures
- Eye protection: Wear facepiece with goggles to protect from scattering dust or toxic liquid.
- Body protection: Wear appropriate protective chemical-resistant clothing.
- Hand protection: Wear appropriate chemical-resistant gloves that protect chemicals directly.
- Protection materials: rubber, neoprene
- Ventilation: Provide local exhaust ventilation system. Check legal suitability of exposure level
- Respiratory protection: Safety measure for respiration is needed for hard exposure. Respiration safety categorized from minimum concentration to maximum concentration. Consider characteristic of warning. Air-purifying respirator with an appropriate, government approved (where applicable), air purifying filter, cartridge or canister. Emergency or planned entry into unknown concentrations or IDLH conditions-Air-line mask(combination air-line respirator), Any air-purifying(full-facepiece respirator)
- As an immediate precautionary measure, isolate spill or leak area in all directions for at least 50meters (150 feet) in all directions.

2) Environmental precautions and protective procedures
○ Atmosphere : Provide local exhaust ventilation system.
○ Land : Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
○ Underwater : Prevent entry into waterways, sewers, basements or confined areas.

3) The methods of purification and removal
○ Small spill
-Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area).
-All equipment used when handling the product must be grounded.
-Do not touch or walk through spilled material.
-Stop leak of you can do it without risk.
-Prevent entry into waterways, sewers, basements or confined areas.
-Vapours suppressing foam may be used to reduce vapours.
-Absorb or cover with sand or other non-combustible material and remove.
-Use clean non-sparking tools to collect absorbed material.

○ Large spill
-Dike far ahead of liquid spill for later material.
-Water spray may reduce vapour; but may not prevent ignition in closed spaces.
-When spilled over limited quantities, inform central government and local self-government.
-Keep unauthorized personnel away.
-Stay upwind and keep out of low area.

7. Handling and storage

1) Precautions for safe handling
-Do not physical impact(pressurization, cutting, grinding, heating) or mechanical processes (welding, soldering, grinding, connecting, boring).
-Provide spark or explosion prevention system.
-Do handle according to safety precautions because of residue in empty containers.
-Do attentively grand static occurrence of container.
-Ventilate entire areas or by local ventilation system.
-Wash and dry carefully contaminated clothing and shoes before reuse.
-Do not breathe gas/fumes/vapours/spray.
-Wash thoroughly after handling.
-Wear suitable protective clothes and face shield.
-Avoid contact with skin, eyes and cloths.

2) Conditions for safe storage
-Store locked up.
-Keep away from oxidizing materials.
-Keep in a cool, dry place and in well-ventilated place.
-Keep away ignition sources.

8. Exposure controls/personal protection

1) Occupational Exposure Limits
○ Regulation in Korean: TWA : 2ppm(11mg/m^3) STEL: 10ppm(55mg/m^3)
○ US (NIOSH/OSHA AGGIH):
- NIOSH- TWA: 10ppm(55mg/m^3)
- ACGIH- TWA: 2ppm
○ Biological Exposure Index: Not available

2) Appropriate engineering controls
-Provide local exhaust ventilation system or other engineering controls to keep the airborne concentrations of vapours below their respective threshold limit value.
-Check legal suitability of exposure level.

3) Personal protective equipment
○ Respiratory protection
-Safety measure for respiration is needed for hard exposure.
-Respiration safety categorized from minimum concentration to maximum concentration.
-Consider characteristic of warning.
-Respirator type: Air-purifying respirator with an appropriate, government approved (where applicable), air purifying filter, cartridge or canister.
-Emergency or planned entry into unknown concentrations or IDLH: conditions-Air-line mask(combination air-line respirator), Any air-purifying(full-facepiece respirator)

○ Eye protection
-Wear facepiece with goggles to protect from scattering dust or toxic liquid.
-An eye wash unit and safety shower station should be available nearby work place.

○ Hand protection
-Wear appropriate chemical-resistant gloves that protect chemicals directly.

○ Body protection
-Wear appropriate protective chemical-resistant clothing.

9. Physical and chemical properties

1) Appearance	Physical state : Liquid Color : Colorless
2) Odor	Pungent odor
3) Threshold of odor	0.1ppb
4) pH	Not available
5) Melting point/freezing point	-64 ˚C
6) Initial boiling point and boiling range	148 ˚C (DIN 51 751)
7) Flash point	29 ˚C (closed cup)
8) Evaporation rate	0.42 (butyl acetate=1)
9) Flammability (solid, gas)	Flammable liquid
10) Upper/lower flammability or explosive limits.	Lower: 1.7% Upper: 9.9%
11) Vapour pressure	5.45mmHg (25 ˚C)
12) Solubility(ies)	1.4 g/L (20 ˚C)
13) vapour density	4.42 (air= 1)
14) Specific gravity	0.898g/cm^3 (20 ˚C)
15) n-octanol/water partition coefficient	logKow= 2.36
16) Auto ignition temperature	267 ˚C (DIN 51 794)
17) Degradation temperature	Not available
18) Viscosity	0.81cp (25 ˚C)
19) Molecular weight	128.17g/mol

10. Stability and reactivity

1) Chemical stability
-Stable under normal temperatures and pressures

2) Possibility of hazardous reactions
-Forms explosive mixtures with air.
-Hazardous polymerization may occur if heated.

3) Conditions to avoid
-Containers may explode when heated.
-Avoid heat, sparks, open flames, or other sources of ignition.

4) Incompatible materials
-Halogens, peroxides, cyanides, acid, base, amines, metals, oxidants

5) Hazardous decomposition product
-Thermal decomposition product : Carbon oxides

11. Toxicological information

1) Information on the likely routes of exposure
○ Inhalation:
short-term exposure: May cause respiratory, nasal mucosa, lung irritation.
long-term exposure: May cause irritation of the nasal mucosa, hemorrhagic discharge from eyes and noses and severe dyspnea.
○ Skin contact :
short-term exposure: May cause erythema, dropsy, necrosis.
○ Eye contact :
short-term exposure: May cause irritation of corneal.

2) Symptoms related to the physical, chemical and toxicological characteristics
-Flammable liquid: Category 3
-Water reactive substances, Organic peroxides: Not applicable (no relevance to molecular structure)
-Refer to "5) Acute and delayed symptoms/effects" of "4.First aid measures"

3) Delay by short term and long term exposures, acute and chronic effect
○ Acute toxicity - Oral : Category 5, LD_{50}= 3410 mg/kg bw (Rat)
- Dermal : Category 5, LD_{50}= 2054 mg/kg bw (Rabbit)
- Inhalation : Category 4, LC_{50}= 10.3 mg/kg bw /4hours (Rat)

○ Skin Corrosion/ Irritation: Category 2
- Moderate to severe erythema and dropsy are observed on rabbits and there is skin irritation on humans and that the skin disease of popular erythematous was observed.

○ Serious Eye Damage/ Irritation: Category 2A
- 0.5 ml undiluted n-butyl acrylate was instilled into the eyes of 5 rabbits (one eye per animal). Observed effects ranged from no injury in one rabbit with moderate effects in 2 rabbits and severe effects (iritis) in 2 rabbits.

○ Respiratory sensitizer: Not available

○ Skin Sensitization: Category 1
-The guinea pigs indicate prolonged contacted skin hypersensitivity. This product causes allergic contact dermatitis based on the result of a patch test in humans.

○ Carcinogenecity: Not classified
- IARC: 3A, ACGIH-A4
- NTP, OSHA, Regulation 1272/2008, US EPA: Not listed
- n-Butyl acrylate showed no carcinogenic effect up to the highest concentration tested of 135ppm. Mortality were not affects signs were not induces and body weights were not affected by the treatment but food consumption was decreased in high dose animals. The treatment did not lead to changes in hematology, urinalysis, gross pathology or organ weights. NOEL=0.086mg/l

○ Mutagenicity: Not classified
In vitro - Chromosomal aberrations test(Chinese hamster V79 cells): Negative
- Micronucleus test(Syrian hamster embryo (SHE): Negative
- Bacterial ames test(S. typhimurium): Negative
- Unscheduled DNA synthesis(Syrian hamster embryo fibroblasts) Test: Negative
In vivo - Cytogenetic assay, inhalation: Negative
- Chromosomal aberration test(mammalian bone marrow cells): Negative

○ Reproductive toxicity: Not classified
- Rat/ There is the description that there is the embryonic lethality, the decreased neonatal weight and decrease of viable fetus in rat inhalation test at dose causing general toxicity to parent animals. NOAEL(developmental toxicity)=100ppm, NOAEL(teratogenicity)=300ppm Mouse/ There is the description that the embryonic lethality, the decreased neonatal weight and teratogenicity in the mouse oral administration and inhalation test. NOAEL(maternal toxicity)=100mg/kg, NOAEL(developmental toxicity)=1000mg/kg, NOAEL(teratogenicity)=2000mg/kg

○ Specific target organ toxicity (single exposure): Category 3(Respiratory irritation)
- Based on the statements that irritation to the respiratory tract in rats was identified and nasal discharges increased and hyperemia of the mucous membranes were observed.

○ Specific target organ toxicity (repeat exposure): Not classified
- Rat(Sprague Dawley), 13 weeks/ The test substance caused eye irritation and irritation of the nasal mucosa. Significant reductions in body weight changes were observed. In the high dose group, 31 of 40 animals died. Hemorrhagic discharge from eyes and noses and severe dyspnea were observed. No abnormal hematology, clinical chemistry, urinalysis, or histopathology findings were reported. NOAEL(drinking water study)=84(male), 111(female)mg/kg bw per day, NOAEL(gavage study)=150mg/kg bw per day(male, female)

○ Aspiration hazard: Not available

12. Ecological information

1) Aquatic Ecotoxicity
-Acute toxicity: Category 2
-Chronic toxicity: Not classified
○ Fish : 96hr-LC_{50}*(Salmo gairdneri)* = 5.2mg/l (OECD TG 203, GLP)
○ Crustacea: : 48hr-EC50*(Daphnia magna)* = 8.2mg/l
○ Algae : 96hr-EC_{50}*(Selenastrum capricornutum)* = 2.6mg/l (OECD TG 201)

2) Persistence and degradability
○ Persistence : Low persistency due to volatility and photochemical degradation
(logKow of all ingredients are less than 4) (logKow=2.36)
○ Degradability
-Hydrolysis: half-life pH3:2800days, pH7:1100days. pH11:243minutes
-Photolysis: half-life = 1.2days(estimated)

3) Bioaccumulative potential
-Readily biodegradable and low potency of bioaccumulation
○ Biodegradation : readily biodegradation, 61% biodegradation after 14days
(OECD 301C, Modified MITI Test(I))
○ Bioaccumulation : BCF = 37 (logKow=2.36)

4) Mobility in soil
- low potency of mobility to soil
Koc=146.2L/kg (fugacity model (Mackay level I) based on the estimated log Kow of 2.36

13. Disposal considerations

1) Disposal method
-Incinerate waste.
-Incinerate residues after treatment by methods of evaporation and condensation.
-Incinerate residues after purification by methods of separation, distillation, extraction and filtration.
-Treat with reactions such as neutralization, oxidation, reduction, polymerization and condensation.
-Incinerate residues after treatment by the methods of cohesion, precipitation, filter and dehydration.
2) Disposal precaution
-Consider the require attentions in accordance with waste treatment management regulation.

14. Transport information

1) UN Number : UN 2348
2) UN Proper shipping name : BUTYL ACRYLATES, STABILIZED
3) Transport Hazard class : Class 3
4) Packing group : III
5) Marine pollutant : No applicable
6) Special safety response for transportation or transportation measure
○ Emergency schedule for fire : F-E
○ Emergency schedule for spillage : S-D

15. Regulatory information

○ Korea
- Korea Occupational Safety and Health Regulation: Listed in occupational exposure limits
- Toxic Chemical Control Act. : Not applicable
- Dangerous Material Safety Management Regulation : Petroleum, class 4-2(non water solubility liquid, 1000L)
- Waste Control Act. : Public Controlled Waste (Waste organic solvent without halogens)

○ EU Classification
- Classification: R10, Xi;R36/37/38, R43
- Risk phrases : R10, R36/37/38, R43
- Safety phrases : S2, S9

○ U.S.A. management information
- OSHA regulation (29CFR1910.119) : Not applicable
- CERCLA 103 regulation (40CFR302.4) : Not applicable
- EPCRA 302 regulation (40CFR355.30) : Not applicable
- EPCRA 304 regulation (40CFR355.40) : Not applicable
- SARA 313 regulation (40CFR372.65) : Not applicable
- EPA (40CFR262) : D001, D003 (Hazardous Waste Number)

○ Rotterdam Convention on the prior informed consent procedure for certain hazardous chemicals and pesticides in international trade : Not applicable

○ Stockholm Convention on Persistent Organic Pollutants (POPs) : Not applicable

○ Mont- real Protocol on Substances that Delete the Ozone Layer : Not applicable

16. Other information

1) Information source and references:

-ECB:ESIS (European chemical Substances Information System) (http://ecb.jrc.it/esis)
-International Uniform Chemical Information Database (IUCLID)
-Organization for Economic Co-operation and Development (OECD) Screening Information Data Set (SIDS)
-IARC. Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man. Geneva: World Health Organization, International Agency for Research on Cancer, 1972-PRESENT. (Multivolume work)., p. S7 216 (1987)
-REGULATION (EC) No 1272/2008 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 December 2008
-Korea Occupational Health & Safety Agency: http://www.kosha.net
-American Conference of Governmental Industrial Hygienists TLVs and BEIs. Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. Cincinnati, OH, 2008, p. 35
-U.S. National library of Medicine (NLM) Hazardous Substances Data Bank (HSDB) (http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB.htm)
- ECOTOX Database, EPA (http://cfpub.epa.gov/ecotox)
- ACGIH, TLV and BEIs # 0108, 2008
- The Estimation Programs interface (EPI) Suites, Syracuse Research Corporation
- http://www.safe.nite.go.jp/japan/sougou/data/pdf/hazard/hyokasyo/No-32.pdf
-Korea dangerous material inventory management system (http://hazmat.nema.go.kr)
-National chemicals information systems (http://ncis.nier.go.kr)
-Incorporated Administrative Agency National Institute of Technology and Evaluation (http://www.safe.nite.go.jp/japan/sougou/data/pdf/hazard/hyokasyo/No-32.pdf)

2) Issue date : 2012. 6. 26

3) Revision number and date : 1997. 1. 20 (10th)

4) Other material safety data sheet information:
LG Chem LTD., Korea Occupational Health & Safety Agency

<History>

Rev. No.	Category	Revision Issue	Date	Respondent
6	ALL	Team leder Change	2006.01.15	Park chan kyo
7	1.3	Emergency response number Change	2009.08.17	Park chan kyo
8	ALL	For GHS Rule	2010.06.21	Park chan kyo
9	2.	Hazard identification Change	2011.11.10	Yu seul bin
10	14.4	IMDG Code Flash point write	2012.6.26	Yu seul bin
11	1.3	Address and Emergency response number change	2014.02.27	Gwak Byeongsoo